WILLIAMS

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S T A R L I G H T®

SERVICE MANUAL
FOR LEVEL-7 GAMES

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WILLIAMS
Electronics, Inc.
3401 N. California Ave.
Chicago, IL 60618

ROM Summary

IC	DESCRIPTION	TYPE	NUMBER	BOARD	PART NO.
Game ROM 1	ROM 4Kx8	2532	IC14	CPU	A-5343-10690*
Game ROM 0	ROM 4Kx8	2532	IC20	CPU	A-5343-10689
Flipper ROM 2	ROM 4Kx8	8332	IC17	CPU	A-5341-09554
Sound ROM	ROM 2Kx8	2716	IC12	Sound	A-5343-10466

NOTICE

TO ORDER REPLACEMENT ROMS from your authorized WILLIAMS distributor, specify (1) part number shown above, (2) ROM-label color, (3) REV level (number) on the label, and (4) which game the ROM is used in.

Control Locations

THE ON-OFF SWITCH is on the bottom of the cabinet near the right-front leg as you face the game.

THE VOLUME CONTROL is accessible through the coin door on the left cabinet-wall.

DIAGNOSTIC SWITCHES. ADVANCE, AUTO-UP/MANUAL-DOWN, and HIGH-SCORE RESET switches are located on the back of the coin door. Refer to Game-Adjustment Procedure and Diagnostic Procedures for operation.

THE MEMORY-PROTECT SWITCH must be open to clear bookkeeping totals and to make game adjustments. This switch is on the inside of the coin-door frame. It automatically opens when the coin door opens.

THE CPU DIAGNOSTIC-SWITCH operates the Memory-Chip Test explained in Diagnostic Procedures. This switch is on the left edge of the CPU Board.

THE SOUND-BOARD DIAGNOSTIC-SWITCH is used to initiate the Sound-Board self-test. In games with System-7 boards, this switch is on the top edge of the Sound Board. Refer to Diagnostic Procedures.

Replacing Circuitboards

CPU BOARD. The level-7, D-8342 CPU Board (batteries at lower left) must be equipped with the ROMs specified above. Only jumpers W3, W6, W8, W10, W11, W14, W17, W19, W20, W22, W25, W26 and W29 should be connected.

DRIVER BOARD. The D-7997 Driver Board must be equipped with zero-ohm resistors or wire jumpers W9 through W16.

SOUND BOARD. The D-8223 Sound Board must be equipped with the STAR LIGHT sound-ROM. Only jumpers W1, W2, W5, W7, W9, W10 and W15 should be connected.

POWER-SUPPLY BOARD. The D-8345 Power-Supply Board is required.

DISPLAY BOARDS. The C-8363 Master-Display Board and 7-digit slave displays are required.

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*Note: German games require part no. A-5343-10690G.

Game Play

- Making L-I-G-H-T lights spinner.
- L-I-G-H-T and S-T-A-R light right lane for bonus holdover.
- Roving light advances bonus multiplier.
- Making 10 stars lights next constellation.
- Pisces lit: right lane lights for extra ball.
- Gemini lit: outlane special lights.
- 2-ball Multi-Ball™ feature doubles scores.
- Lighting bonus holdover on last ball awards bonus time.

Game Operation

GAME-OVER MODE. Turn the game ON. The PLAYER-1 score shows 00, all player scores flash the high score and the GAME-OVER lamp lights. All playfield-lamps cycle in Attract Mode.

CREDIT POSTING. Insert coins. A sound is produced and the number of credits is displayed. If maximum credits* are exceeded by coin or high score, credits are posted correctly. But the coin lockout de-energizes until the remaining credits are below the maximum. No credits may be won (and coins are rejected) while the coin lockout is de-energized.

GAME START. Push the CREDIT button. A start-up tune is played, a ball is served, and the CREDIT display is reduced by one. PLAYER 1 UP flashes until the first scoring-switch is made, and the BALL-IN-PLAY display shows 1. Additional players may enter the game by pushing the CREDIT button before BALL 2 is displayed.

TILT. The ball in play is tilted on the first closure of the ball-roll or playfield tilts and the third* closure of the plumb-bob tilt. The slam tilt on the coin door returns the game to the Game-Over Mode.

END OF GAME. Match digits* appear in the BALL-IN-PLAY display. Credit* is awarded for a match. Match, high score and game-over sounds are made as appropriate. One replay is awarded for each score you beat in the displays.*

Power Turn-On And Game Setup

WARNING

This game must be plugged into a properly-grounded outlet to prevent shock hazard and to assure proper game-operation. DO NOT use a "cheater" plug to defeat the ground pin on line cord, and DO NOT cut off ground pin.

WARNING

FCC STICKER. Check the back of your game to see that an FCC-certification sticker was attached to your game at the factory. All games that leave WILLIAMS' plants have been tested and found to comply with FCC Rules. As the sticker is proof of this fact, legal repercussions to the owner and distributor of the game may result if the sticker is missing. If you receive any WILLIAMS game (manufactured after December 1982) that has no FCC sticker, call WILLIAMS for advice or write us a note on your game-registration card. Be sure the card bears your game's serial number.

* indicates adjustable feature.

ENTERING GAME-OVER MODE. With the coin door closed, plug the game in and turn it ON. The game should come on in Game-Over Mode.

1. If the game comes on in the Bookkeeping Mode (CREDITS display showing 04, BALL-IN-PLAY display showing 00, and PLAYER-1 display showing the game-identification number) turn the game OFF and ON again.

   A. If the game now comes on in Game-Over Mode, bookkeeping totals have been reset to zero.
   B. If the game still comes on in Bookkeeping Mode, open the coin door and turn the game OFF and ON twice. (A game without battery power will revert to factory settings.) Any changes from factory settings must be re-entered.

2. If the game still comes on in Bookkeeping Mode, troubleshoot the game.

Bookkeeping Mode
(Functions 01-17)

1. Set the AUTO-UP/MANUAL-DOWN switch to AUTO-UP and press ADVANCE. Test 04 is indicated in the CREDITS display, Function 00 in the MATCH display, and the game-identification number in the PLAYER-1 display.

2. Press ADVANCE to display desired functions on the MATCH display (See the Bookkeeping Table below). Now record the corresponding totals (number of coins and total paid-credits) from the PLAYER-1 display. (To review a total that has been advanced past, use MANUAL-DOWN and press ADVANCE).

3. Use MANUAL-DOWN and press ADVANCE to display Function 50 in the MATCH display.

4. Returning to Game-Over Mode:
   A. Use AUTO-UP and press ADVANCE.
   B. OR: To zero bookkeeping totals and return to Game-Over Mode, (1) use AUTO-UP, (2) press the credit button to display 35 in the PLAYER-1 display, and (3) press ADVANCE.

Bookkeeping Table

FUNCTION	PLAYER-1 DISPLAY	PLAYER-2 DISPLAY
00	Game Identification (2520 1)	--
01	Coins, Left chute (closest to coin door hinge)	--
02	Coin, center chute	--
03	Coin, right chute	--
04	Total Paid Credits	--
05	Special Credits	--
06	Replay-Score Credits	--
07	Match Credits	--
08	Total Credits	Free Credits
09	Total Extra Balls	--
10	Ball Time in Minutes	--
11	Total Balls Played	--
12	Current High-Score	--
13	Highest Score	High-Score Credits Awarded
14	Replay-Level 1	Times exceeded
15	Replay-Level 2 or Backup High-Score	2 Times exceeded
16	Replay-Level 3 or Backup High-Score	3 Times exceeded
17	Replay-Level 4 or Backup High-Score	4 Times exceeded

Game-Adjustment Procedure
(Functions 13-41)

Coin door must be open to change settings

1. Use AUTO-UP and press ADVANCE. Test 04 is indicated in the CREDITS display, function 00 in the MATCH display, and the game-identification number in the PLAYER-1 display.

2. To raise the function number in the MATCH display, use AUTO-UP and push ADVANCE. To lower the function number, use MANUAL-DOWN and push ADVANCE.

3. With the desired function indicated in the MATCH display, raise the value in the PLAYER-1 display by using AUTO-UP and pressing the credit button. Reduce the value by using MANUAL-DOWN and pressing the credit button. The value remaining in the PLAYER-1 display is the new setting. Refer to the Game-Adjustment Table and the Pricing Table.

4. ADVANCE to the next function and then repeat the previous step until all adjustments have been made.

5. Hold down ADVANCE until Function 50 is indicated in the MATCH display. From Function 50 you can return to Game-Over Mode or restore factory settings. Perform either of the following as desired.

6. To return to Game-Over Mode use AUTO-UP and press ADVANCE.

7. To restore factory settings and zero bookkeeping totals:
   A. Using AUTO-UP press the CREDIT button until 45 is indicated in the PLAYER-1 display.
   B. Press ADVANCE. The game returns to Test 04, function 00.
   C. Use MANUAL-DOWN and press ADVANCE to indicate function 50.
   D. Use AUTO-UP and press ADVANCE.

Resetting The Four High-Scores

1. Using the GAME-ADJUSTMENT PROCEDURE above, set functions 13, 15, 16 and 17 to the desired reset-values.

2. Set function 39 to 01.

3. Set function 40 to 04.

4. Use AUTO-UP and hold down ADVANCE until function 50 is indicated in the MATCH display.

5. Return to Game-Over Mode by pressing ADVANCE.

6. In Game-Over Mode, press HIGH-SCORE RESET. Four scores should come up on the displays.

7. One credit (up to four credits in one game) will be awarded for each high score that's beaten.

Game-Adjustment Table

FUNCTION	DESCRIPTION	FACTORY SETTING[1]
13	Highest Score High score credits awarded--function 40)	2,500,000
14	First Replay-Level	2,000,000
15	Second Replay-Level or Second-Highest Score	00
16	Third Replay-Level or Third-Highest Score	00
17	Fourth Replay-Level or Fourth-Highest Score	00
18	Maximum Credits	30
19	Standard and Custom Pricing-Control	01/02
20	Left Coin-Slot Multiplier	01/09
21	Center Coin-Slot Multiplier	04/45
22	Right Coin-Slot Multiplier	01/18
23	Coin Units Required For Credit	01/05
24	Coin-Units Bonus-Point	00/45
25	Minimum Coin-Units	00
26	Match 00: Match on 01: Match off	00
27	Special 00: Awards credit 01: Awards extra ball 02: Awards points	00
28	Replay: 00: Awards credit 01: Awards extra ball 02: No award	00
29	Maximum Plumb-Bob Tilts (including warnings)	03
30	Number of Balls (including bonus ball)	03
31	Game-Adjustment #1 - Top Rollover Lanes 00: Lane spots 1 star in constellation 01: Lane spots 2 stars in constellation	01
32	Game-Adjustment #2 - Background Sound 00: Background sound off 01: Background sound on	01
33	Game-Adjustment #3 00: "LOCK" and holdover lamp not carried to next ball 01: "LOCK" carried to next ball 02: Holdover carried to next ball 03: "LOCK" and holdover carried to next ball	00
34	Game-Adjustment #4 - Time to complete bonus holdover 00: 5 seconds 01: 8 seconds 02: 10 seconds 03: On for the remainder of the ball	03
35	Game-Adjustment #5 00: 10,000 lamp in "LIGHT" score-string off 01: 10,000 lamp in "LIGHT" score-string on	01
36	Game-Adjustment #6 01: Extra ball hard 00: Extra ball easy	00
37	Game-Adjustment #7 00: No memory on "STAR", "LIGHT" and eject extra-ball lamps 01: Extra-ball lamp carried to next ball 02: "STAR" & "LIGHT" lamps carried to next ball 03: "STAR", "LIGHT" and extra-ball lamps carried to next ball	01

Game-Adjustment Table (cont'd)

38	Game-Adjustment #8	01
	00: Lane extra-ball and special lamps not carried to next ball	
	01: Extra ball and special lamps carried to next ball	
39	Game-Adjustment #9	00
	00: Displays one high score	
	01: Displays four high scores	
40	Maximum high-score credits	03
	00: Displays high scores without credit payouts	
41	Maximum Extra-Balls at any time	04
42-49	Not Used	
50	Special Function	
	15: Auto-Cycle Mode	
	35: Zero bookkeeping totals	
	45: Restore factory settings & zero bookkeeping totals	

NOTES

1. The second factory-setting value is with jumper W25 on the CPU Board removed.
2. Functions 13 through 17 may be set to any multiple of 100,000 points. Setting function 40 to zero with function 13 set to any score but zero permits the high-score feature to operate but no credits are awarded.
3. Setting functions 14 through 17 (replay levels) to zero disables the replay-score point.
4. Function 39 also determines whether functions 14 through 17 represent replay levels (function 39, setting 00) or high scores (setting 01).

Pricing Table

●indicates standard settings by adjusting ONLY function 19

Coin-Door Mechanism	Games/Price	Function 19	20	21	22	23	24	25
Twin-Quarter	●1/25¢, 4/$1	1	1	4	1	1	0	0
or	●1/50¢, 3/$1, 6/$2	3	1	4	1	2	4	0
Quarter,	●1/50¢, 2/75¢, 3/4x25¢	5	3	15	3	4	15	0
Dollar,	2/25¢, 8/$1	0	2	8	2	1	0	0
Quarter	1/25¢, 3/50¢, 6/$1	0	1	4	1	1	2	0
	1/25¢, 5/$1	0	1	4	1	1	4	0
	1/50¢	0	1	4	1	2	0	0
1DM, 5DM, 2DM	●1/1DM, 3/2DM, 10/5DM	2	9	45	18	5	45	0
	2/1DM, 5/2DM, 14/5DM	0	13	65	26	5	65	0
20¢, 50¢	1/20¢, 3/50¢	0	6	0	15	5	0	0
1F, 10F, 5F	●1/2F, 3/5F only, 8/10F only	4	1	16	6	2	0	0
25-Cent	●1/25¢, 4/1G	6	1	0	4	1	0	0
1-Guilder	1/25¢, 5/1G	0	1	0	4	1	4	0
5-Franc,	●1/5F, 2/10F	7	1	0	2	1	0	0
10-Franc	●1/10F	8	1	0	2	2	0	0
1-Franc or	1/1F, 3/2F	0	1	1	1	1	2	0
Twin 1-Franc	1/1F	0	1	1	1	1	0	0
Twin 2-Franc	●1/2F, 3/4F	3	1	4	1	2	4	0
10F, 20F	●1/10F, 2/20F	7	1	0	2	1	0	0
Twin 100-Yen	2/100Y	0	2	0	2	1	0	0
100L, 200L	●1/200 Lire	8	1	0	2	2	0	0
Twin 1-Sucre	1/3S, 2/5S	0	2	0	2	5	0	0
Any	Free Play	set function 18 to 0 for free play						

Game Pricing

PRICING MADE EASY. Function 19 allows a shorthand method of setting the pricing functions. If a number from one to eight is entered into function 19, a corresponding standard setting (shown in the pricing table above) will be entered into the game. The rest of the pricing functions are automatically set for that standard.

FOR CUSTOM SETTINGS first set function 19 to zero. Then set the remaining values according to the pricing table.

THE GAMES : PRICE RATIO is equivalent to the ratio X : VC,
where:
X = COIN-SLOT MULTIPLIER (the number at function 20, 21 or 22)
V = COIN VALUE
C = COIN UNITS REQUIRED FOR CREDIT (the number at function 23)

For example at factory settings with quarter chutes the variables produce 1 : 25x1 or one game for 25¢.

Diagnostic Procedures

DISPLAY TEST

1. Use MANUAL-DOWN and press ADVANCE. Displays should indicate all 0's.

2. Use AUTO-UP. Displays should sequence from all 0's through all 9's. Comma segments should come on when the odd digits are displayed.

3. To stop cycling use MANUAL-DOWN. Press ADVANCE to step through the tests one number at a time. Use AUTO-UP to resume cycling.

SOUND TEST

1. (From Display Test) Use AUTO-UP and press ADVANCE. Test 00 should be indicated in the CREDITS display and the MATCH display should sequence from 00 through 06. A different sound should be produced for each number.

2. To continuously pulse a single sound use MANUAL-DOWN. Press ADVANCE to sequence through sounds one at a time. Use AUTO-UP to resume sequencing.

LAMP TEST

1. Refer to the Lamp-Matrix Table for lamp numbers and wiring. Driver-Board connections at jacks 2J5 (columns) and 2J7 (rows) are also shown there.

2. (From Sound Test) Use AUTO-UP and press ADVANCE. Test 01 should be indicated in the CREDITS display and all feature-lamps should flash.

SOLENOID TEST

1. Refer to the Solenoid Table for solenoid numbers and wiring. Driver-Board connections at plugs 2P9, 2P11 and 2P12 are also shown there.

2. (From Lamp Test) Use AUTO-UP and press ADVANCE. Test 02 should be indicated in the CREDITS display. The MATCH display sequences from 01 through 25. Corresponding solenoids 01 through 24 are pulsed. The flipper relay is de-energized with subtest 25.

3. To continuously pulse a single solenoid use MANUAL-DOWN. Press ADVANCE to sequence through the solenoids one at a time. Use AUTO-UP to resume sequencing.

SWITCH TEST

1. Refer to the Switch-Matrix Table for switch numbers and wiring. Driver-Board connections at jacks 2J2 (columns) and 2J3 (rows) are also shown there.

2. (From Solenoid Test) Use AUTO-UP and press ADVANCE. Test 03 should be indicated in the CREDITS display with the switch numbers sequencing in the BALL-IN-PLAY display.

   As a switch number is displayed a sound is produced. As a switch is opened, its number is removed from the sequence. When all switches are open, the BALL-IN-PLAY display is blank and the sounds stop.

3. HOLD DOWN EACH SWITCH so its number is shown at least twice. A sound is produced and a switch number is momentarily indicated in the BALL-IN-PLAY display.

   ROW PROBLEMS. If two switches in a row are indicated with only one switch closed, check for a short between the column wires.

   FOR MULTIPLE INDICATIONS check the column wire for a short to ground.

   COLUMN PROBLEMS. If two switches in a column are indicated with only one switch closed, check for a short between row wires.

4. PLAYFIELD OR DRIVER BOARD? To determine whether the problem is in the playfield or the Driver Board, remove connectors 2P2 and 2P3 from the Driver Board. Now enter the Switch Test. Use a jumper wire to simulate switch operation:

   For example, on the Switch-Matrix Table notice that placing a jumper between 2J2-pin 8 and 2J3-pin 9 should produce an indication of switch 09 being closed.

AUTO-CYCLE MODE

1. The Auto-Cycle Mode permits you to check intermittent problems in the playfield, backbox, cabinet and driver board.

2. Set function 50 of Test 04 (Bookkeeping Mode) to 15.

3. Press ADVANCE to start the Auto-Cycle Mode. This mode repeatedly sequences through the Display Test, Sound Test (00), Lamp Test (01), and Solenoid Test (02).

4. This sequence is repeated until the game is turned off and on.

MEMORY-CHIP TEST

Press the DIAGNOSTIC button on the left side of the CPU Board. The following indications are provided.

0-test passed (game returns to Game-Over Mode)
1-IC13 RAM faulty
2-IC16 RAM faulty
3-IC17 ROM 2 faulty
4-IC17 ROM 2 faulty
5-IC20 ROM 1 faulty
6-IC14 Game-ROM 1 faulty
7-IC26 Game-ROM 0 faulty
8-IC19 CPU-Board lockup; also check memory-protect circuit and CMOS RAM
9-Coin-door closed, memory-protect circuit faulty, or IC19 CMOS RAM faulty

Note that "0" remaining after power turn-on indicates CPU-Board lockup.

SOUND-BOARD SELF-TEST

1. PRESS THE DIAGNOSTIC BUTTON at the top of the Sound Board. Several electronic sounds should be produced. This sequence of sounds is repeated until the game is turned OFF and back ON.

2. NO SOUND IN DIAGNOSTIC TEST (but sounds are present in the Self-Test): Check the sound-select inputs (connector 10J3 and adjacent circuitry) or replace the Sound Board and rerun the Diagnostic Test (see SOUND TEST above).

3. NEW SOUND-BOARD, SAME SYMPTOM: Check the cables to the CPU Board. If they're good, replace the CPU Board and rerun the Diagnostic Test.

4. NO SOUND: Check +12V, -12V and +5V-supply voltages on the Sound Board. If voltages are low (or AC ripple seems too high), replace C27 and C26.

   A. ripple of over 0.75 VAC across C27 is excessive

   B. ripple of over 0.005VAC across the output of the regulator IC is excessive

4. STILL NO SOUND: Turn the volume control all the way up. With the game turned on, momentarily place a powered-up AC soldering-pencil on the center tap of the volume control. DO NOT use a soldering iron of over 40 watts. Cordless models will NOT work here.

   (A) If you hear a low hum, the power-amplifier chip (TDA2002), volume control and speaker are okay.

   (B) If you don't hear a hum, try the test again with the volume control turned halfway up.

Solenoid Table

SOL. NO.	FUNCTION	WIRE COLOR	CONNECTIONS DR. BD. OTHER	DRIVER TRANS.	SOLENOID PART-NO.
01	Outhole	GRY-BRN	2P11-4, 8P3-1	Q15	SA-23-850-DC
02	Ramp Eject	GRY-RED	2P11-5, 8P3-2	Q17	SG-1-23-850-DC
03	Eject Hole	GRY-ORN	2P11-7, 8P3-3	Q19	SG-1-23-850-DC
04	Flash Lamps	GRY-YEL	2P11-8, 8P3-4	Q21	-
05	Not Used	GRY-GRN	2P11-9, 8P3-5	Q23	-
06	Not Used	GRY-BLU	2P11-3, 8P3-6	Q25	-
07	Not Used	GRY-VIO	2P11-2, 8P3-7	Q27	-
08	Not Used	GRY-BLK	2P11-1, 8P3-8	Q29	-
09	Not Used	BRN-BLK	2P9-9, 8P3-9	Q31	-
10	Not Used	BRN-RED	2P9-7, 8P3-10	Q33	-
11	General Illumination	BRN-ORN	2P9-1, 3P7-1	Q35	5580-09555
12	Not Used	BRN-YEL	2P9-2, 8P3-12	Q37	-
13	Not Used	BRN-GRN	2P9-3, 8P3-13	Q39	-
14	Not Used	BRN-BLU	2P9-4, 8P3-14	Q41	-
15	Knocker	BRN-VIO	2P9-5, 7P1-17	Q43	SA-2-23-850-DC
16	Coin Lockout Coil	BRN-GRY	2P9-6, 7P1-18, 7P2-4	Q45	904218-696
*17	Left Kicker	BLU-BRN	2P12-7, 8P3-17	Q2	SG1-23-850-DC
*18	Right Kicker	BLU-RED	2P12-4, 8P3-18	Q4	SG1-23-850-DC
*19	Left Jet Bumper	BLU-ORN	2P12-4, 8P3-19	Q6	SG1-23-850-DC
*20	Lower Jet Bumper	BLU-YEL	2P12-6, 8P3-20	Q8	SG1-23-850-DC
*21	Right Jet Bumper	BLU-GRN	2P12-8, 8P3-12	Q10	SG1-23-850-DC
*22	Not Used	BLU-BLK	2P12-9, 8P3-22	Q12	-
	Right Flipper*	BLU-VIO	2P12-1, 7P1-7	-	FL24/600-30-2600-50VDC
	Left Flipper*	BLU-GRY	2P12-2, 7P1-9	-	FL24/600-30-2600-50VDC

*NOTES

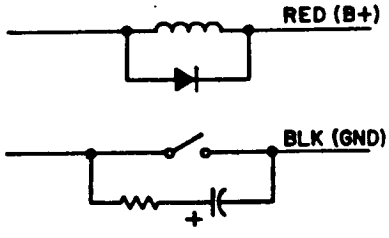
1. Special-switch connections for solenoids 17 through 21 are as follows:
   17--ORN-BRN--2P13-5, 8P3-24
   18--ORN-RED--2P13-3, 8P3-25
   19--ORN-BLK--2P13-2, 8P3-26
   20--ORN-YEL--2P13-4, 8P3-27
   21--ORN-GRY--2P13-8, 8P3-28

2. FLIPPER COILS. This game requires 50-volt flipper coils. For proper operation, the replacement part shown MUST be used.

3. Flipper-button connections:
   Right--ORN-VIO--2P12-1, 7P1-7
   Left--ORN-GRY--2P12-2, 7P1-9

4. Solenoid 16 has a Coinco part-number.

5. Typical wiring for solenoids and special switches follows.



Lamp-Matrix Table

ROW \ COLUMN	1 YEL-BRN 2J5-8	2 YEL-RED 2J5-9	3 YEL-ORN 2J5-6	4 YEL-BLK 2J5-7	5 YEL-GRN 2J5-3	6 YEL-BLU 2J5-5	7 YEL-VIO 2J5-1	8 YEL-GRY 2J5-2
RED-BRN 2J7-1	GAME-OVER 1	2X 9	L 17	SPINNER 25	STAR 8 33	TOP LN 6 41	10,000 49	LEO 57
RED-BLK 2J7-2	MATCH 2	3X 10	I 18	STAR 1 26	STAR 9 34	TOP LN 7 42	30,000 50	ARIES 58
RED-ORN 2J7-3	TILT 3	5X 11	G 19	STAR 2 27	STAR 10 35	TOP LN 8 43	50,000 51	LIBRA 59
RED-YEL 2J7-4	HIGH-SCORE-TO-DATE 4	10X 12	H 20	STAR 3 28	TOP LN 1 36	TOP LN 9 44	100,000 & LITES EJT. 2	PISCES 60
RED-GRN 2J7-5	SHOOT AGAIN (INSRT)5	S 13	T 21	STAR 4 29	TOP LN 2 37	TOP LN 10 45	EX BALL R LANE 53	VIRGO 61
RED-BLU 2J7-6	BALL IN PLAY 6	T 14	ADV'X' LEFT TGT 22	STAR 5 30	TOP LN 3 38	LEFT SPECIAL 46	EX.BALL (EJECT) 54	GEMINI 62
RED-VIO 2J7-9	ALL SCORES DBL 7	A 15	ADV'X' R LANE 23	STAR 6 31	TOP LN 4 39	RIGHT SPECIAL 47	LOCK (EJECT) 55	STAR 63
RED-GRY 2J7-8	BONUS HOLD-OVER 8	R 16	ADV'X' R TGT 24	STAR 7 32	TOP LN 5 40	LITES BNS H/O ARR. 48	SHOOT AGAIN PLFD 56	LIGHT 64

Switch-Matrix Table

ROW \ COLUMN	1 GRN-BRN 2J2-9	2 GRN-RED 2J2-8	3 GRN-ORN 2J2-7	4 GRN-YEL 2J2-6	5 GRN-BLK 2J2-5	6 GRN-BLU 2J2-3	7 GRN-VIO 2J2-2	8 GRN-GRY 2J2-1
WHT-BRN 2J3-9	PLUMB-BOB TILT 1	OUTHOLE 9	L 17	SPINNER 25	STAR 8 33	LEFT JET 41	UPR L SWITCH 49	NOT USED 57
WHT-RED 2J3-8	BALL-ROLL TILT 2	RAMP 1 10	I 18	STAR 1 26	STAR 9 34	LOWER JET 42	LEFT KICKER 50	NOT USED 58
WHT-ORN 2J3-7	CREDIT BUTTON 3	RAMP 2 11	G 19	STAR 2 27	STAR 10 35	RIGHT JET 43	RIGHT KICKER 51	NOT USED 59
WHT-YEL 2J3-6	LEFT COIN 4	SHOOTER LANE SW 12	H 20	STAR 3 28	TOP LNS 1-2 36	LEFT FLIPPER RET. 44	EJECT 52	NOT USED 60
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Warnings & Notices

WARNING

FOR SAFETY AND RELIABILITY, WILLIAMS does not recommend or authorize any substitute parts or modifications of WILLIAMS equipment.

USE OF NON-WILLIAMS PARTS and modifications of game circuitry may adversely affect game play, or may cause injuries.

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This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to correct the interference.

RF-INTERFERENCE NOTICE

CABLE-HARNESS PLACEMENTS and ground-strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by FCC regulations.

TO MAINTAIN THESE LEVELS, reposition harnesses and reconnect ground straps to their original placements if they should be disconnected during maintenance.

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